PATENT
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Application of:	
Cha Deok DONG et al.	
Application No.: To be assigned	Group Art Unit: Unknown
Filed: Concurrently herewith	Examiner: Unknown
For: METHOD OF MANUFACTURING FLASH MEMORY DEVICE	

Commissioner for Patents
Washington, D.C. 20231

Sir:

PRELIMINARY AMENDMENT

Prior to the examination of the above-identified application, please amend the above-identified application as follows:

IN THE CLAIMS:

Please replace claims 1-9, with the following:

1.(Amended) A method of manufacturing a flash memory device, comprising the steps of:

sequentially forming a tunnel oxide film and a first polysilicon film on a semiconductor substrate;

etching the first polysilicon film and a first portion region of the tunnel oxide film;

forming a lower oxide film on the semiconductor substrate;

performing a nitrification process to form a nitrogen layer below the lower oxide film;

performing an annealing process using an oxygen gas so that the nitrogen layer is transferred to a surface of the lower oxide film, thus forming a nitride film;

forming an upper oxide film on the semiconductor substrate to form a dielectric film including the lower oxide film, the nitride film, and the upper oxide film;

sequentially forming a second polysilicon film, a tungsten silicide film, and an anti-reflection film on the semiconductor substrate;

patterning the anti-reflection film, the tungsten silicide film, the second polysilicon film, and the dielectric film to form a control gate; and

patterning the first polysilicon film and the tunnel oxide film to form a floating gate.

2.(Amended) The method according to claim 1, wherein the lower oxide film is formed using DCS gas and one of N_2O and NO gas at a temperature of 810-850°C.

3.(Amended) The method according to claim 1, wherein the lower oxide film is formed to a thickness of 35-100Å at a deposition rate of 4-10Å/min.

4.(Amended) The method according to claim 1, wherein the nitrification process is performed by introducing one of N_2O and NO of 1-20 into a furnace at a temperature of 810-850°C for 10-20 minutes, thus forming a nitrogen layer of 3-5Å in thickness in the lower oxide film.

5.(Amended) The method according to claim 1, wherein the annealing process using an oxygen gas is performed by introducing the oxygen gas of 5-20 into a furnace at a temperature of 850-950°C for 5-20 minutes.

6.(Amended) The method according to claim 1, wherein the upper oxide film is formed using DCS gas and one of N_2O and NO gas at a temperature of 810-850°C.

7.(Amended) The method according to claim 1, wherein the upper oxide film is formed to a thickness of 35-100Å at a deposition rate of 4-10Å/min.

8.(Amended) The method according to claim 1, wherein the second polysilicon film is formed in a double structure of a doped polysilicon film and an undoped polysilicon film.

9.(Amended) The method according to claim 8, wherein the polysilicon film and the undoped polysilicon film are deposited at a ratio of 4:1-7:1.

Conclusion

The foregoing amendments are being made to place the application in condition for examination. A favorable action on the merits is respectfully solicited.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attachment is captioned "Version with markings to show changes made."

If there are any other fees due in connection with the filing of this paper, please charge the fees to our Deposit Account No. 50-0310. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully Submitted,

By: _____
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Dated: December 7, 2001

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Claim 1 has been amended as follows:

1.(Amended) A method of manufacturing a flash memory device, comprising the steps of:

sequentially forming a tunnel oxide film and a first polysilicon film on a semiconductor substrate**:**

~~[and then]~~ etching ~~[said]~~ **the** first polysilicon film and a ~~[given]~~ **first portion** region of ~~[said]~~ **the** tunnel oxide film;

forming a lower oxide film on the ~~[entire structure]~~ **semiconductor substrate**;

performing a nitrification process to form a nitrogen layer below ~~[said]~~ **the** lower oxide film;

performing an annealing process using an oxygen gas so that ~~[said]~~ **the** nitrogen layer is ~~[moved on the]~~ **transferred to a** surface of ~~[said]~~ **the** lower oxide film, thus forming a nitride film;

forming ~~[a]~~ **an** upper oxide film on the ~~[entire surface]~~ **semiconductor substrate** to form a dielectric film ~~[consisting of said]~~ **including the** lower oxide film, ~~[said]~~ **the** nitride film**,** and ~~[said]~~ **the** upper oxide film;

sequentially forming a second polysilicon film, a tungsten silicide film**,** and an anti-reflection film on the ~~[entire structure]~~ **semiconductor substrate**;

patterning ~~[said]~~ **the** anti-reflection film, ~~[said]~~ **the** tungsten silicide film, ~~[said]~~ **the** second polysilicon film, and ~~[said]~~ **the** dielectric film to form a control gate~~[,]~~**;** and

~~[then]~~ patterning ~~[said]~~ **the** first polysilicon film and ~~[said]~~ **the** tunnel oxide film to form a floating gate.

Claim 2 has been amended as follows:

2.(Amended) The method ~~[of manufacturing a flash memory device]~~ according to claim 1, wherein ~~[said]~~ **the** lower oxide film is formed using DCS gas and **one of** N_2O ~~[or]~~ **and** NO gas at ~~[the]~~ **a** temperature of ~~[810 - 850]~~ **810-850**°C.

Claim 3 has been amended as follows:

3.(Amended) The method ~~[of manufacturing a flash memory device]~~ according to claim 1, wherein ~~[said]~~ **the** lower oxide film is formed ~~[in]~~ **to a** thickness of ~~[35 - 100]~~ **35-100**Å at ~~[the]~~ **a** deposition rate of ~~[4 - 10]~~ **4-10**Å/min.

Claim 4 has been amended as follows:

4.(Amended) The method ~~[of manufacturing a flash memory device]~~ according to claim 1, wherein ~~[said]~~ **the** nitrification process is performed by introducing **one of** N_2O ~~[or]~~ **and** NO of ~~[1 - 20]~~ **1-20** into ~~[the]~~ **a** furnace at ~~[the]~~ **a** temperature of ~~[810 - 850]~~ **810-850**°C for ~~[10 - 20]~~ **10-20** minutes, thus forming a nitrogen layer of ~~[3 - 5]~~ **3-5**Å in thickness in ~~[said]~~ **the** lower oxide film.

Claim 5 has been amended as follows:

5.(Amended) The method ~~[of manufacturing a flash memory device]~~ according to claim 1, wherein ~~[said]~~ **the** annealing process using ~~[the]~~ **an** oxygen gas is performed by introducing ~~[an]~~ **the** oxygen gas of ~~[5~20]~~ **5-20** into ~~[the]~~ **a** furnace at ~~[the]~~ **a** temperature of ~~[850~950]~~ **850-950**°C for ~~[5~20]~~ **5-20** minutes.

Claim 6 has been amended as follows:

6.(Amended) The method ~~[of manufacturing a flash memory device]~~ according to claim 1, wherein ~~[said]~~ **the** upper oxide film is formed using DCS gas and **one of** N_2O ~~[or]~~ **and** NO gas at ~~[the]~~ **a** temperature of ~~[810~850]~~ **810-850**°C.

Claim 7 has been amended as follows:

7.(Amended) The method ~~[of manufacturing a flash memory device]~~ according to claim 1, wherein ~~[said]~~ **the** upper oxide film is formed ~~[in]~~ **to a** thickness of ~~[35~100]~~ **35-100**Å at ~~[the]~~ **a** deposition rate of ~~[4~10]~~ **4-10**Å/min.

Claim 8 has been amended as follows:

8.(Amended) The method ~~[of manufacturing a flash memory device]~~ according to claim 1, wherein ~~[said]~~ **the** second polysilicon film is formed in a double structure of a doped polysilicon film and an undoped polysilicon film.

Claim 9 has been amended as follows:

9.(Amended) The method ~~[of manufacturing a flash memory device]~~ according to claim 8, wherein ~~[said]~~ **the** polysilicon film and ~~[said]~~ **the** undoped polysilicon film ~~[is]~~ **are** deposited at ~~[the]~~ **a** ratio of ~~[4:1 ~ 7:1]~~ **4:1-7:1**.